Johnson

electronic equipment

OPERATING MANUAL

VIKING CHALLENGER TRANSMITTER

E. F. Johnson Company

WASECA, MINNESOTA

PRINTED IN U.S.A.

FORM 206Q086-A

STANDARD WARRANTY

Adopted and Recommended by the Electronic Industries Association

The E. F. Johnson Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part, except for electron tubes, in exchange for any part of any unit of its manufacture which under normal installation, use and service disclosed such defect, provided the unit is delivered by the owner to us or to our authorized radio dealer or wholesaler from whom purchased, intact, for our examination, with all transportation charges prepaid to our factory, within ninety days from the date of sale to original purchaser and provided that such examination discloses, in our judgement, that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, unauthorized modifications, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture, nor to electron tubes.

The Radio Parts Distributor will assume the responsibility for replacement or exchange of any component part of a unit approved for remedy or exchange hereunder, through the factory Customer Service Department, without charge to the owner.

Defective electron tubes and executed service report should be returned prepaid directly to the tube manufacturer for adjustment at the following addresses:

(a) RCA tubes to: Adjustment Service, RCA at the nearest of the following addresses:

34 Exchange Place
Jersey City 2, N. J.

3601 South Adams St.
Marion, Indiana

6355 East Washington Blvd.
Los Angeles 22, California

(b) General Electric tubes to:

Adjustment Service
Owensboro Tube Works
General Electric Co.
Owensboro, Kentucky

(c) Amperex tubes to:

Amperex Electronic Corp.
230 Duffey Avenue
Hickville, Long Island
New York

(d) Eimac tubes to:

Eitel-McCullough, Inc.
San Bruno,
California

(e) Sylvania tubes to: Any Authorized Sylvania Distributor.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products.

NOTE: Tubes marked "E. F. Johnson Co.," regardless of manufacturer, should be returned to E. F. Johnson Co., Waseca, Minnesota.

JOHNSON VIKING CHALLENGER TRANSMITTER

OPERATING MANUAL CONTENTS

		Page
A.	GENERAL DESCRIPTION	1
B.	CONTROLS, CONNECTORS AND FEATURES	1
	1. Crystal and VFO	1
	2. Band Switch	2
	3. Operate Switch	2
	4. Meter Switch	3
	5. Excitation Control	3
	6. Driver Control	3
	7. Final Amplifier Tuning Control (Plate)	3
	8. Loading Controls	3
	9. Keying	4
	10. Microphone and Audio	4
	11. Antenna Connector	4
	12. Antenna T-R Switch	4
	13. Fuses	4
C.	INSTALLATION	4
D.	TUNING AND OPERATION	5
	1. - 14. Tuning Procedure	5-6
	15. Neutralizing	6
	16. VFO Zeroing	7
E.	TROUBLE SHOOTING	7
F.	TABLES	8-9-10
G.	ILLUSTRATIONS	Following Page 10
H.	PARTS LIST	Following Illustrations

PAUL A. MYERS
KOKOMO, INDIANA
April 1960

11/59

Bought Transmitter Saturday April 9, 1960 (Georges Electronic) $154.75
Factory wired - Catalog No. 240-182-2 Serial No. 43797
(Order No. WJ 3289)

COLOR	SIGNIFICANT FIGURE	DECIMAL MULTIPLIER	TOLERANCE %	VOLTAGE RATING *
BLACK	0	1	-	—
BROWN	1	10	1	100
RED	2	100	2	200
ORANGE	3	1,000	3	300
YELLOW	4	10,000	4	400
GREEN	5	100,000	5	500
BLUE	6	1,000,000	6	600
VIOLET	7	10,000,000	7	700
GRAY	8	100,000,000	8	800
WHITE	9	1,000,000,000	9	900
GOLD	-	0.1	5	1000
SILVER	-	0.01	10	2000
NO COLOR	-	—	20	500

* APPLIES TO CONDENSERS ONLY.

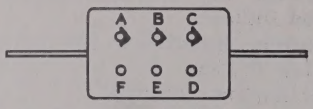
COLOR CODING OF FIXED RESISTORS

A - FIRST SIGNIFICANT FIGURE OF RESISTANCE IN OHMS.

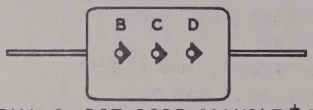
B - SECOND SIGNIFICANT FIGURE.

C - DECIMAL MULTIPLIER.

D - RESISTANCE TOLERANCE IN PERCENT. IF NO COLOR SHOWN TOLERANCE IS ±20 %.



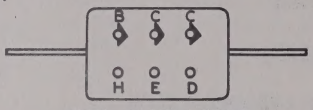
JAN FIXED CAPACITORS



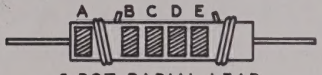
RMA 3-DOT CODE 500 VOLT ±20%

COLOR CODING OF FIXED CONDENSERS

A - TYPE: MICA BLACK, PAPER SILVER.
B - FIRST SIGNIFICANT FIGURE OF CAPACITY.
C - SECOND SIGNIFICANT FIGURE.
D - DECIMAL MULTIPLIER.
E - TOLERANCE.
F - CHARACTERISTIC.
G - THIRD SIGNIFICANT FIGURE.
H - VOLTAGE RATING.

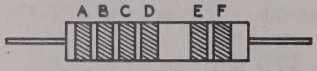


RMA 6-DOT CODE



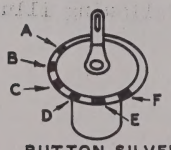
5-DOT RADIAL LEAD CERAMIC CAPACITOR

A - TEMP. COEFFICIENT.
B - FIRST SIGNIFICANT FIGURE.
C - SECOND SIGNIFICANT FIGURE.
D - DECIMAL MULTIPLIER.
E - TOLERANCE.



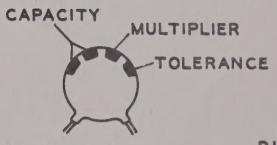
MOLDED PAPER TUBULAR CAPACITOR

A - FIRST SIGNIFICANT FIGURE.
B - SECOND SIGNIFICANT FIGURE.
C - DECIMAL MULTIPLIER.
D - TOLERANCE.
E - FIRST SIGNIFICANT VOLTAGE FIGURE.
F - SECOND SIGNIFICANT VOLTAGE FIGURE.



BUTTON SILVER MICA CAPACITOR

A - CLASS
B - TOLERANCE
C - MULTIPLIER
D - THIRD DIGIT
E - SECOND DIGIT
F - FIRST DIGIT



4-DOT DISC CERAMIC RMA CODE

DIPPED MICA CAPACITOR

THE TOLERANCE RATING OF CAPACITORS IS DETERMINED BY THE COLOR CODE. FOR EXAMPLE: RED = 2%, GREEN = 5%, ETC. THE VOLTAGE RATING OF CAPACITORS IS OBTAINED BY MULTIPLYING THE COLOR VALUE BY 100. FOR EXAMPLE: ORANGE = 3 X 100 OR 300 VOLTS. BLUE = 6 X 100 OR 600 VOLTS.

THE PHYSICAL SIZE OF CARBON RESISTORS IS DETERMINED BY THEIR WATTAGE RATING. CARBON RESISTORS MOST COMMONLY USED ARE 1/2 WATT. HIGHER WATTAGE RATED RESISTORS WHEN SPECIFIED ARE PROGRESSIVELY LARGER PHYSICALLY.

STANDARD COLOR CODE

PUSH-TO-TALK MODIFICATION FOR CHALLENGER

This modification enables the operator to have push-to-talk phone operation on the Challenger, and also provides control of an antenna relay. In CW position, the relay is actuated by the Operate switch. It involves enlarging 1 hole and drilling 5 new ones. Dress all leads as shown on back of sheet.

New Parts Needed:

1 - Relay, Potter Brumfield KA14D, 110 volt DC coil, 3PDT or equivalent
1 - 47K 2 watt resistor
1 - 22K 2 watt resistor
1 - Mic connector, Amphenol PC2F or equiv. (Use PC2M on mic. cord.)
1 - Ceramic connector, Female, E.F.J. #126-105 (available from distributor, or
1 - Ceramic connector, Male, E.F.J. #111-99 E. F. JOHNSON Co. $.50 ppd.)
6'- Insulated wire
1 - 4-40 x 3/8 screw, nut and lockwasher

1. ( ) Unsolder C-27, .001 mfd. capacitor from terminal 1 of J4. Remove the two screws holding J4 and discard J4. Enlarge this hole to 5/8" or size necessary to accomodate the particular jack you are using for the push-to-talk mic. Install jack in hole and secure. Drill 3 holes for relay jack and 2 holes for relay as per sketch. Mount the relay in position indicated. Mount relay jack as indicated.

2. ( ) Unsolder the resistor R25, from terminal 2 of SW3A. Connect the end just unsoldered to pin 3 of XV3. Connect a wire from pin 3 of XV3 to terminal 9 of relay. Solder at both ends.

3. ( ) Remove the jumper from terminal 2 of SW3A to terminal 4 of SW3A. Connect a wire from terminal 4 of SW3A to terminal 11 (coil connection) of the relay. Solder at terminal 4 only.

4. ( ) Remove jumper from terminal 12 of SW3A to terminal 12 of SW3B. Connect a jumper from terminal 12 of SW3A to terminal 3 of SW3B. Solder both ends.

5. ( ) Remove jumper from terminals 8, 9 and 11 of SW3A. Remove the black wire from terminal 8 and connect to terminal 11 of SW3A. Connect a jumper from terminal 8 of SW3A to terminal 12 of SW3A. Connect a wire from terminal 8 of SW3A to terminal 4 of relay. Solder both ends. Connect a wire from terminal 9 of SW3A to terminal 6 of the relay. Connect a wire from terminal 8 of relay to pin 5 of V6, 6AQ5. Solder both ends.

6. ( ) Connect a wire from terminal 2 of TS7 to terminal 1 of relay jack. Solder both ends. Terminal 2 of the second terminal nearest the underside of top of the chassis.

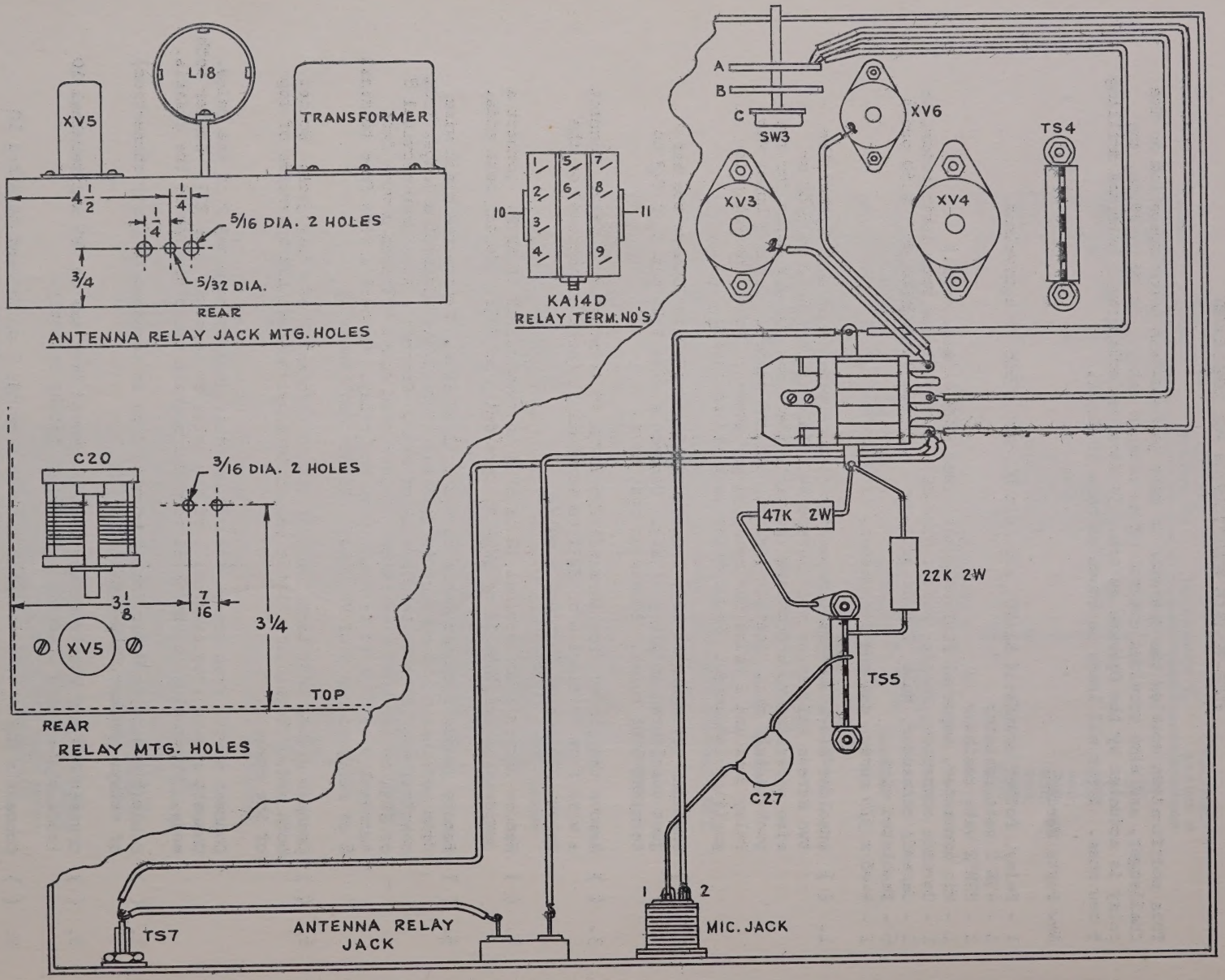
   Connect a wire from terminal 2 of the relay jack to terminal 2 of the relay. Connect a wire from terminal 3 of the relay to terminal 3 of TS7. Solder both ends. Terminal 3 is the third terminal nearest the underside of the chassis.

7. ( ) Connect a wire from terminal 2 of mic. jack to terminal 11 (coil connection) of relay. Solder both ends.

8. ( ) Connect a 47K 2 watt resistor between ground terminal on TS5 and terminal 10 (coil connection) of relay. Solder at ground end only.

9. ( ) Connect a 22K 2 watt resistor between terminal 1 of TS5 and terminal 10 (coil connection) of relay. Solder both connections.

10/59


L18
XV5
TRANSFORMER
4 1/2
1/4
1/4
5/16 DIA. 2 HOLES
3/4
5/32 DIA.
REAR
ANTENNA RELAY JACK MTG. HOLES
1
2
3
4
5
6
7
8
9
10
11
KA14D
RELAY TERM. NO'S
A
B
C
SW3
XV6
XV3
XV4
TS4
C20
3/16 DIA. 2 HOLES
3 1/8
7/16
3 1/4
XV5
TOP
REAR
RELAY MTG. HOLES
47K 2W
22K 2W
TS5
C27
TS7
ANTENNA RELAY JACK
1
2
MIC. JACK

A. GENERAL DESCRIPTION

The Johnson Viking Challenger is a single knob bandswitched shortwave transmitter which covers the amateur 80 through 6 meter bands and provides both CW and Phone operation. Crystal or external VFO frequency control is provided by simple front panel plug-in arrangement without switching.

The power input rating is 120 watts CW and 70 watts Phone with the input restricted to 85 watts on the 6 meter band. A panel mounted meter monitors plate current (power input) and grid current of the final amplifier.

The meter leads and AC line cord utilize individual RF filters to supplement the excellent cabinet shielding and bonding which provides very good suppression of spurious radiation and harmonics and reduces interference to other services.

The circuitry employs a 6DS5 crystal oscillator (RF amplifier when driven by a VFO), a 6DQ6A as an RF buffer-driver, and a pair 6DQ6A's in parallel, bridge-neutralized, as the final power amplifier. A 12AX7 dual triode functions as a two stage speech amplifier to drive a 6AQ5 clamp tube modulator. On CW, the 6AQ5 clamps the final amplifier screens to limit the key-up plate dissipation. A 5U4GB rectifier delivers D.C. power to all stages.

The keyed CW waveform is shaped by an iron core choke, L1 and capacitor, C3, to eliminate key clicks.

The power consumption at the recommended nominal input voltage of 117 volts is:

115 watts in the "STBY" position
120 watts in the "TUNE" position
210 watts in the "PHONE" position
250 watts in the "CW" position

The satisfaction to be derived from this equipment will be a direct result of one's understanding of its operation and the care used in tuning it. Read the instructions carefully for thorough understanding.

B. CONTROLS, CONNECTORS AND FEATURES

1. CRYSTAL AND VFO

The CRYSTAL and VFO socket, J1, is located on the front panel of the transmitter to facilitate changing crystals or VFO. The crystal socket pin spacing accomodates standard type FT-243 crystals. 160 or 80 meter crystals should be used for 80 meter operation and 40 meter crystals used for 40, 20, 15 and 10 meter operation. For 6 meter operation, crystals in the 8.334 to 9 mc range should be used. A 6DS5 serves as an electron-coupled crystal oscillator.

A VFO can be plugged directly into the octal VFO socket through which power is fed to the VFO and the VFO RF output is fed back to the transmitter to the 6DS5 grid. The 6DS5 now serves as an RF amplifier for the VFO. The Johnson Model 122 VFO (for 80-10 meter operation) or the Johnson 6N2 VFO (for 6 meter operation) can be plugged directly into the Challenger after the following slight modification.

B. 1. 6N2 VFO MODIFICATION

Remove ground lead in pin 4 of octal plug and connect it to pin 1. Add jumper between pins 5 and 6, solder both pins.

MODEL 122 VFO MODIFICATION

Remove the coaxial plug from the RF output cable. When unsoldering be careful not to damage the insulation.

Remove the cap from the octal plug.

Insert the RF output coaxial cable into the grommet of the octal plug cap and pull the cable out to the length of the plug. Connect a 100 mmf. capacitor to the inside conductor of the RF cable, make the lead as short as practical. Solder the connection and wrap with insulating tape. Place the other lead so that it protrudes through the pin (pin 4) and solder the connection. Connect the braid to pin 1 and solder. Replace cap on the plug.

Add jumper between pins 5 and 6, solder both pins.

The VFO has output on 160 meter and 40 meter bands. Use 160-80 meter position for 80 meter operation and 40, 20, 15 and 10 position for operation on 40, 20, 15 and 10 meters.

2. BAND SWITCH

A single knob bandswitch is used for switching all circuits to the proper band. SW1 is the bandswitch and consists of 2 wafers using both sides of the wafer for switching. SW1A front, switches the oscillator plate tank, SW1A rear, switches the multiplier tank. SW1B front, switches in 75 mmf. of padder on 80 meters for the final tank. SW1B rear, handles the switching of the final tank. After plugging in the proper VFO or crystal and selecting the band and frequency on the VFO, make sure the "BANDSWITCH" knob on the transmitter is on the desired band.

3. OPERATE SWITCH

The OPERATE switch has 5 positions, OFF, TUNE, PHONE, STANDBY and CW. It is designated SW3 and has 2 wafers plus the AC line switch and performs the following functions:

a. When the switch is turned from "OFF" to "TUNE" position, AC is applied to the primary of T1 the power transformer. The clamp tube, V6 6AQ5, grid is switched to the grid of the final, below the choke L10. No screen voltage is applied to the final because SW3A which supplies the screen is in an open position. Voltage is applied to the plates and screens of the other stages. The key is connected to the key line. This permits tuning of the oscillator and driver stages for correct final grid current.

b. When the "OPERATE" switch is turned to "PHONE" position, the audio is fed to the grid of V6, the 6AQ5 clamp tube. The B plus is put on the clamper plate and the final screens.

c. When the "OPERATE" switch is turned to "STANDBY" position the B plus is removed from the clamper plate and final screens. The key is disconnected from the key line.

B. 3. d. When the "OPERATE" switch is turned to "CW" the grid of V6 is switched to the grid of the final below L10. R23 and R34 in the plate of V6 are shorted out as is R24 and C36 in the Cathode of V6. B plus is applied to the clamper plate and the screens of the final. The key is connected to the key line.

4. METER SWITCH

The meter switch, SW4, is located on the front panel below the meter. It is a slide switch. Move the switch to the left for grid current, to the right for plate current. Normal grid current is 5 ma. for 80 - 10 meter operation and 2 1/2 ma. for 6 meter operation. Normal plate current is 215 ma. except on 6 meters where it is 150 ma.

5. EXCITATION CONTROL

The EXCITATION CONTROL is a variable capacitor, C6, in the plate circuit of V1, 6DS5, oscillator stage. By detuning the oscillator tank less voltage is supplied to the driver tube resulting in less grid current at the final stage. The proper grid current for bands 80 - 10 meters is 5 ma. This is read on the lower scale of the meter. On 6 meters the grid current is to be set at 2.5 ma. The "EXCITATION" control is adjusted after the DRIVER control has been peaked.

6. DRIVER CONTROL

A variable capacitor, C12, which is operated by the "DRIVER" knob, tunes the plate tank circuit of V2, 6DQ6A. It is tuned by observing the meter in "GRID" position and tuning the capacitor for maximum indication on the meter. On the higher frequencies the "EXCITATION" control may have to be tuned slightly to obtain a grid current reading. The plate circuit of V2, 6DQ6A is always on the operating frequency so the final amplifier is operating straight through. The driver is bridge neutralized. C7 and C11 are the capacitors in the bridge circuit. The tube is protected by R6, a 1800 ohm resistor in the cathode circuit. The stage is capacitively coupled to the final by C13, a 50 mmf. capacitor.

7. FINAL AMPLIFIER TUNING CONTROL

The plate control tunes the final amplifier plate circuit. It is always tuned for minimum PLATE current (dip).

8. LOADING CONTROLS

The "LOADING" controls serve to couple or load the final amplifier to the antenna system. Two loading controls, coarse and fine, are provided on coaxial shafts, coarse on the large knob, fine on the small knob.

Proper loading adjustment is achieved by making small increases in "LOADING" knob positions (increased numbers for increased loading) and tuning "PLATE" for minimum plate current (dip) after each incremental loading adjustment, until desired plate current value is obtained.

B. 9. KEYING

The key jack, J2, is located on the rear apron of the chassis. It is a closed circuit jack and grounds the key line when there is no plug inserted. A 75 Mallory, P155, or equivalent will fit the jack. The key controls V1, the 6DS5 oscillator, and V2 the 6DQ6A driver by opening the cathodes. To prevent the full plate voltage from appearing across the key, R3, a 47K ohm resistor, is placed from the key line to ground. This holds the voltage across the key to less than 50 volts. The keyed wave is shaped by L1, a 2 henry choke and C3 a 2 mfd. capacitor. The key may be a straight hand key, automatic (bug) key or an electronic key.

10. MICROPHONE AND AUDIO

The microphone jack, J4, is the single phono type connector. The jack is located on the rear apron of the chassis. V5, a 12AX7, serves as the speech amplifier. Any good high impedance microphone will develop enough audio for a good signal. When the transmitter is switched to "PHONE" the audio output is switched to the grid of V6, 6AQ5, the clamper tube.

11. ANTENNA CONNECTOR

The antenna connector is a coaxial SO-239 type. It will accept a PL259 type plug. It is located on the rear apron of the chassis.

12. ANTENNA T-R SWITCH

No provision has been made for antenna relay control as it is assumed that a modern electronic T-R switch such as the Johnson 250-39 will be used.

13. FUSES

The line cord plug is of the enclosed fuse type. Two five ampere fuses are used. The equipment operates from 105 to 125 volts A.C. single phase 50/60 cps. To replace fuses, merely insert a small diameter object in the hole at the rear of the plug, and push the fuse out. A new fuse can be inserted from the plug end.

C. INSTALLATION

1. Observe all packages for damage due to mishandling or abuse during shipment.

2. Open all packages and inspect contents for hidden damage or missing parts. Remove chassis from cabinet and remove all packing materials.

3. Report all claims for transportation damage immediately to the carrier and not to the E. F. Johnson Company.

4. Report any missing parts to the Distributor from whom the unit was purchased.

5. TUBE INSTALLATION

Be sure that all tubes are installed in their correct sockets as shown in Figure E. Plate caps should be carefully pushed unto the 6DQ6A tubes. Place chassis in cabinet securing all fastenings tightly.

C. 6. GROUND LEAD

A heavy copper wire or strap should be used to ground the transmitter by connecting it to the ground stud on the rear chassis apron. The length of the ground wire should be as short as possible. The use of several ground leads, each of a different length and selected at random, may be helpful in keeping the grounding impedance low at the transmitter even though the transmitter is some distance away from a true earth ground.

7. ANTENNA SYSTEM

Connect a good antenna to the transmitter and receiver through a modern electronic T-R switch such as the Johnson 250-39. Remember that the effectiveness of any transmitter depends to a major extent upon the antenna system. Try to obtain the best antennas - as high and as in the clear as possible.

8. KEY AND MICROPHONE

The key and microphone should be plugged into their respective jacks and placed in convenient operating positions.

D. TUNING AND OPERATION

It is assumed that the previous sections A, B and C have been read and understood, that ground wire and antenna have been attached, the key and microphone connected. Close key and leave closed until instructed otherwise. To facilitate gaining tuning familiarity, a dummy load consisting of a 75 watt light bulb with short leads may be used in place of the antenna.

1. With "OPERATE" switch in "OFF" position, plug line cord of transmitter into 117 volt (105 to 125 volt range), 50/60 cps. A.C. outlet.

2. Plug desired crystal or VFO into socket on front panel.

3. Set BAND switch to desired band. Set VFO, if used, to desired frequency.

4. Place meter switch in "GRID" position.

5. From Table 1 (page 8) set all dials to settings given for end of band desired.

6. Turn "OPERATE" switch to "TUNE". This turns on the transmitter which will warm up in approximately 30 seconds.

7. Adjust "DRIVER" tuning control for maximum grid current as indicated by the meter.

8. Adjust EXCITATION control for five (5) ma. grid current as read on lower scale of the meter. The grid current should be set at 5 ma. on the 80, 40, 20, 15 and 10 meter bands and set at 2.5 ma. only on the 6 meter band.

9. Switch the meter to PLATE position.

10. Rotate the "OPERATE" switch to the CW position. Immediately tune the "PLATE" for plate current dip (minimum plate current) as read by the meter

D. 10. (upper meter scale reads plate current). The transmitter is properly loaded to the antenna system when the plate current is 215 ma. (150 ma. on 6 meters only). At this point the plate current will probably be other than 215 ma. so the following adjustment will result in proper loading.

11. Adjust coarse and fine "LOADING" controls to increase or decrease plate reading (clockwise adjustment increases reading). After each incremental adjustment of the loading, the "PLATE" should be adjusted for dip. Adjustment for dip should always be the last adjustment.

The transmitter tuning procedure has been completed when the plate current at dip is 215 ma. (150 ma. on 6 meters). Retuning will only be necessary if bands are changed, if frequency is changed appreciably within a band, or different antenna systems used.

12. Switch meter to "GRID". Adjust EXCITATION for 5 ma. grid current (2.5 ma. on 6 meters) if the current has changed from this value. During operation, the meter may be left in either the "PLATE" or "GRID" position but both currents should be monitored occasionally to assure proper tuning and loading.

13. The key may now be opened and manipulated for CW communication.

14. PHONE operation merely requires switching the "OPERATE" switch to the "PHONE" position after first loading the transmitter in CW position to the specified values. The OPERATE switch is then manipulated between "STANDBY" and "PHONE" to listen or transmit, respectively. Speak clearly and directly into the microphone for best results. Adjust distance from microphone for best audio reports. Readjust grid current to 5 ma. if necessary (2.5 ma. on 6 meters).

TUNING RESUME

Tuning is simply the adjustment necessary to obtain 215 ma. plate current at dip (150 ma. on 6 meters) with 5 ma. grid current (2.5 ma. on 6 meters).

Loading is the same for CW or PHONE operation - always load in the CW position - switching to PHONE after loading in CW first.

NOVICE OPERATION

For NOVICE operation on 80, 40 and 15 meters, load the final to 125 ma. at plate current dip with 5 ma. grid current. This will give 75 watts input.

15. NEUTRALIZATION

The power amplifier of the Viking Challenger is neutralized by C37 a double spaced Johnson type S capacitor. The capacitor adjustment is reached from below the chassis. The capacitor is located near the center of the chassis. Wired transmitters have been neutralized at the factory.

CAUTION: THE NEUTRALIZING CAPACITOR HAS FULL PLATE VOLTAGE APPLIED TO IT. ADJUSTMENT SHOULD BE MADE WITH AN INSULATED SCREWDRIVER.

VIKING CHALLENGER OPERATING MANUAL

ERRATA SHEET

In the table on page 9 change the reading of pin 6 of XV2 from 22K ohms to infinite.

On the schematic, Figure F, delete L5 and C9, connecting R5 directly to pin 5 of V2.

Delete from the parts list page 1, l 22.827 C9 and on page 2, l 22.1193 L5.

1/19/60

D. 15. Tune up the transmitter at any convenient frequency on the 15 meter band and load the amplifier to 150 ma. with a dummy load (75 watt light bulb with short leads). Note the exact reading of the "PLATE" dial where resonance (minimum plate current) occurs.

Turn the meter switch to the "GRID" position. Detune the "PLATE" dial slightly in the direction which causes grid current to increase. (Don't move "PLATE" dial far nor leave the amplifier out of resonance very long because plate current increases rapidly and plate dissipation becomes prohibitive).

If an increase in grid current occurs with a decrease in "PLATE" dial reading, the neutralizing capacity is too great.

If an increase in grid current occurs with an increase in "PLATE" dial reading, the neutralizing capacity is too small.

Adjust C37 in the direction indicated, retune amplifier to resonance while observing grid current, detune "PLATE" dial again in the direction causing grid current to rise. Repeat this step as necessary.

The amplifier is neutralized when detuning the "PLATE" causes little or no change in grid current or when detuning the "PLATE" dial in either direction causes grid current to fall off.

16. VFO ZEROING

To zero beat a signal with the VFO, turn the OPERATE switch to TUNE and zero the VFO. If a key is plugged into the transmitter, it must be closed to actuate the VFO.

E. TROUBLE SHOOTING

Operating problems may be due either to tube failure, component failure, or improper operational technique. Frequently, malfunction of a piece of equipment such as the Challenger is a result of tube failure. Meter readings will usually indicate the probable stage affected and servicing requires only substitution of known good tubes. In any case, the tubes should be tested first and eliminated as the source of trouble.

To service the equipment, make liberal use of current values, normal voltage readings and resistance measurements appearing in this manual.

Look first for the simple faults but remember that a component failure often produces a second collateral component failure and to restore normal operation both must be remedied.

TABLE 1

VIKING CHALLENGER TYPICAL DIAL SETTINGS

Oscillator VFO 50 Ohm Resistive Load Final Plate Current 80-10 Meters 215 MA.
6 Meters 150 MA.

Freq. MC.	Driver	Excitation	Plate	Course-Loading-Fine	
3.5	45	7	32	3	2
4.0	90	2	60	4	1
7.0	52	5	56	4	4
7.425	72	3	62	4	5
14.0	74	7	84	5	1
14.4	84	8	86	5	1
21	60	8	86	5	2
21.4	66	8	88	5	2
28	66	6	90	5	2
29.7	82	7	94	5	2
26.8	54	6	88	5	2
27.4	58	6	90	5	2
50	68	9	84	5	2
54	88	9	90	5	3

These settings are approximate and may vary with component tolerances and antenna impedances.

VIKING CHALLENGER RESISTANCE MEASUREMENTS

ALL SWITCHES IN THE EXTREME COUNTER-CLOCKWISE POSITION.

	TUBE	RESISTANCE TO CHASSIS
XV1	6DS5	
	1	100K ohms
	2	50K ohms
	3	0 ohms
	4	0 ohms
	5	26K ohms
	6	50K ohms
	7	100K ohms
XV2	6DQ6A	
	1	50K ohms
	2	0 ohms
	3	Infinite
	4	26K ohms
	5	22K ohms
	6	~~22K~~ ohms "INFINITE"
	7	0 ohms
	8	50K ohms
XV3	6DQ6A	
	1	32K ohms
	2	0 ohms
	3	Infinite
	4	0 ohms
	5	8K ohms
	6	8K ohms
	7	0 ohms
	8	0 ohms
XV4	6DQ6A	
	1	Infinite
	2	0 ohms
	3	Infinite
	4	0 ohms
	5	8K ohms
	6	Infinite
	7	0 ohms
	8	0 ohms

	TUBE	RESISTANCE TO CHASSIS
XV5	12AX7	
	1	600K ohms
	2	1 meg. ohms
	3	0 ohms
	4	0 ohms
	5	0 ohms
	6	600K ohms
	7	1 meg. ohms
	8	5.6K ohms
	9	0 ohms
XV6	6AQ5	
	1	100K ohms
	2	1.2K ohms
	3	0 ohms
	4	0 ohms
	5	22K ohms
	6	45K ohms
	7	100K ohms
XV7	5U4GB	
	1	26K ohms
	2	32K ohms
	3	Infinite
	4	145 ohms
	5	28K ohms
	6	145 ohms
	7	0 ohms
	8	31K ohms

VIKING CHALLENGER TRANSFORMER AND CHOKE MEASUREMENTS

T1 - 22.1501 CSTC #27568

LEADS	OPEN CIRCUIT	RESISTANCE
Red to Red Yellow	790 V.A.C.	145 ohms
Red to Red Yellow	790 V.A.C.	145 ohms
Red to Red		290 ohms
Black to Black		2.2 ohms
Green to Green	6.2 V.A.C.	.06 ohms
Yellow to Yellow	5.1 V.A.C.	.09 ohms

L16 - 22.1502 CSTC #27569

Black to Red 160 ohms

L1 - 22.1333

Black to Black 68 ohms

VIKING CHALLENGER VOLTAGE MEASUREMENTS

TABLE 3

LINE VOLTAGE 117 V.A.C.
RF LEAD 50 ohms
OSCILLATOR VFO
FINAL PLATE 7 MC 215 MA.
50 MC 130 MA.
MEASURED WITH A 20K OHM/V METER FROM CHASSIS.
VOLTAGE TOLERANCE, PLUS OR MINUS 20%.

* Read voltage at terminal 4 of TS4.
** Read voltage at pin 1 of XV3.
# Read voltage at pin 1 of XV7.
Read voltage at pin 1 of TS4.

TUBE	C.W. KEY DOWN 7 MC.	C.W. KEY DOWN 50 MC.	C.W. KEY UP 7 MC.	PHONE 7 MC.	PHONE 50 MC.	STANDBY
FINALS - - 6DQ6A						
*PLATE	580	580	650	625	625	680
##GRID	-36	-25	-.45	-38	-25	-.49
SCREEN	105	90	10	53	60	0
DRIVER - - 6DQ6A						
**PLATE	580	580	650	625	600	680
GRID	0	0	0	0	0	0
SCREEN	180	175	200	180	180	215
CATHODE	37	80	53	38	80	55
CLAMPER - - 6AQ5						
PLATE	170	91	10.6	115	115	0
GRID	-36	-25	-.45	0	0	0
SCREEN	105	200	100	175	185	185
CATHODE	0	0	0	13	13	13
AUDIO - - 12AX7						
1-PLATE	42	47	65	42	46	65
2-GRID	-.38	-.38	-.4	-.35	-.51	-.4
3-CATHODE	0	0	0	0	0	0
6-PLATE	75	85	165	75	75	160
7-GRID	0	0	0	0	0	0
8-CATHODE	.8	.8	1.3	.8	.8	1.5
RECTIFIER - - 5U4GB						
PLATE	750AC	750AC	790AC	780AC	780AC	800AC
FILAMENT	590DC	580DC	650DC	595DC	595DC	680DC
JUNCTION OF R28-R29	190DC	215DC	320DC	190DC	215DC	345DC
OSCILLATOR - - 6DS5						
#PLATE	190	190	320	180	180	320
GRID	-2	-0	-0	-2.5	-0	-0
SCREEN	120	140	320	125	145	320
CATHODE	3.5	4.8	53	3.6	4	53

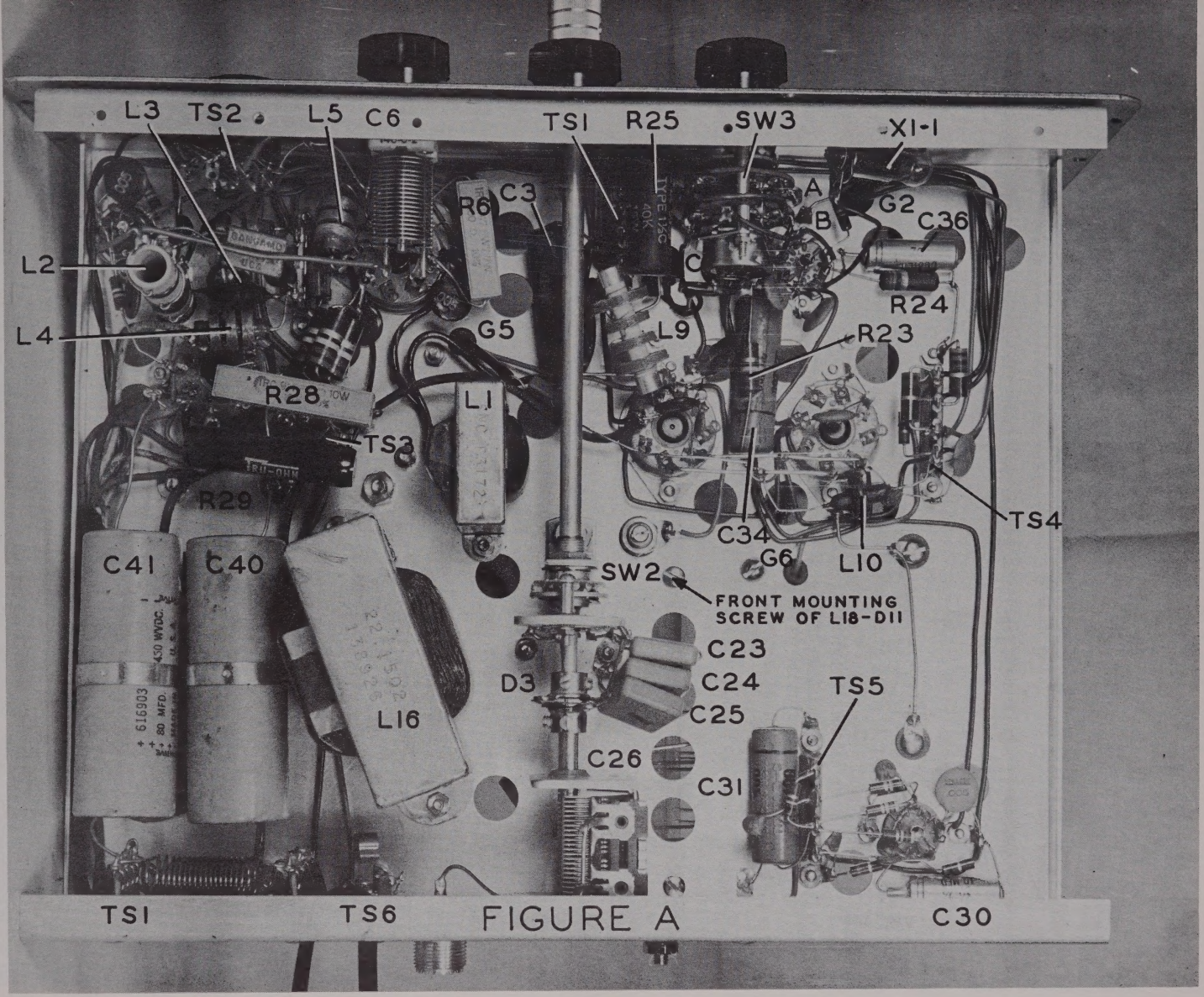

L3
TS2
L5
C6
TS1
R25
SW3
XI-1
A
B
C
G2
C36
R24
R23
L9
R6
C3
L2
L4
G5
R28
L1
TS3
R29
C41
C40
L16
C34
G6
L10
TS4
SW2
FRONT MOUNTING SCREW OF L18-D11
C23
C24
C25
D3
TS5
C26
C31
TS1
TS6
C30

FIGURE A

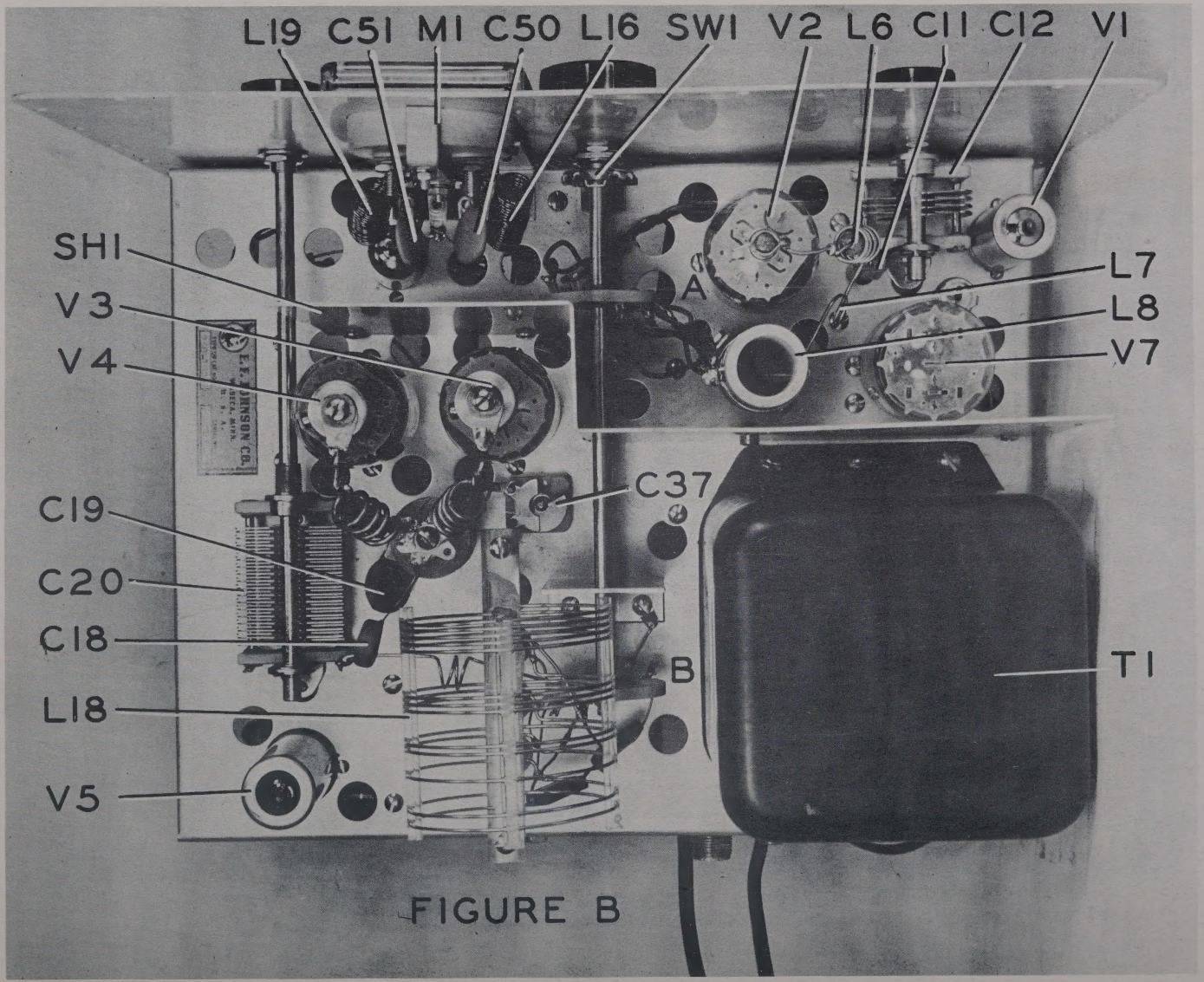

L19
C51
M1
C50
L16
SW1
V2
L6
C11
C12
V1
SH1
V3
V4
A
L7
L8
V7
C37
C19
C20
C18
B
T1
L18
V5

FIGURE B

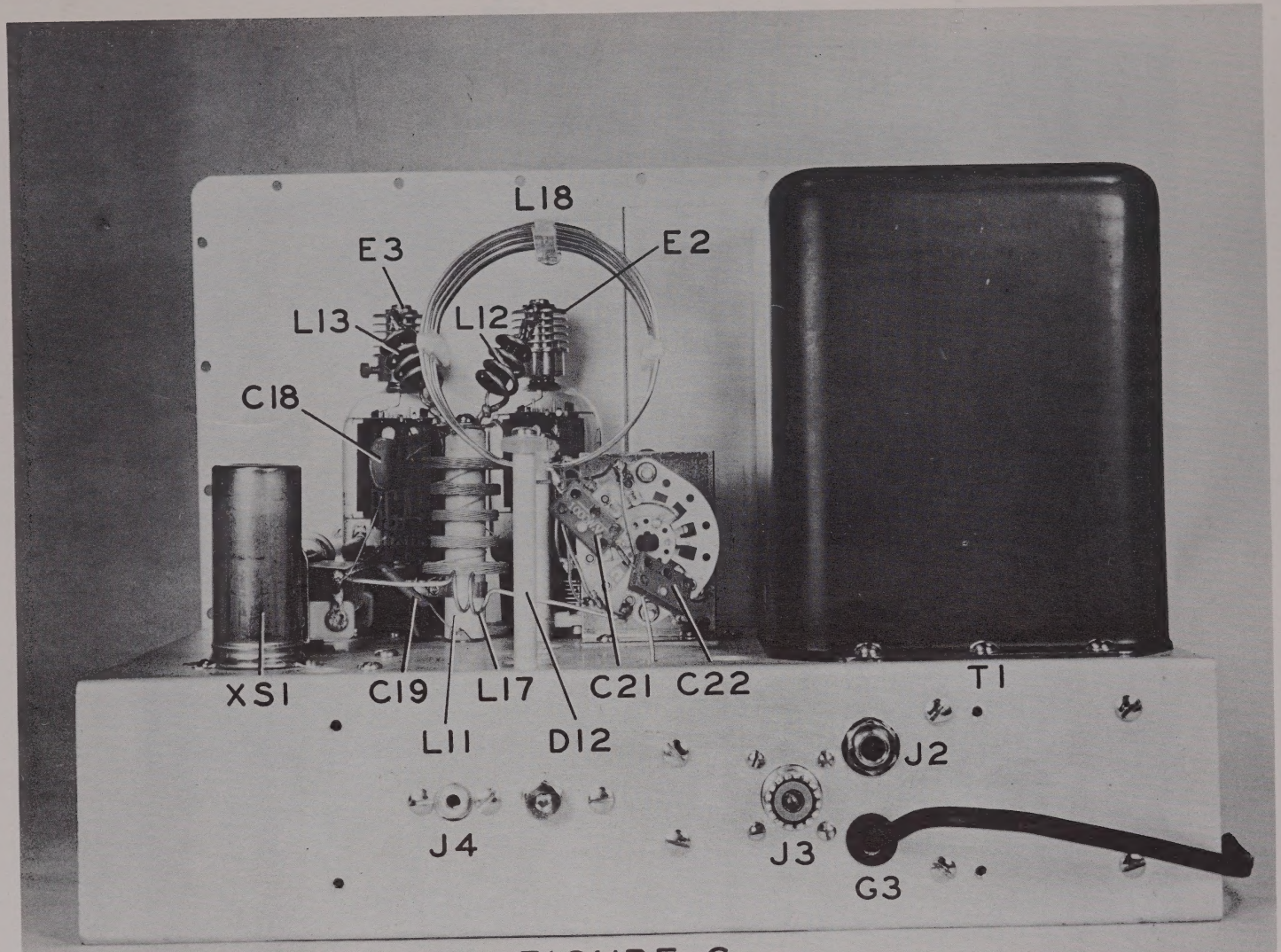


FIGURE C

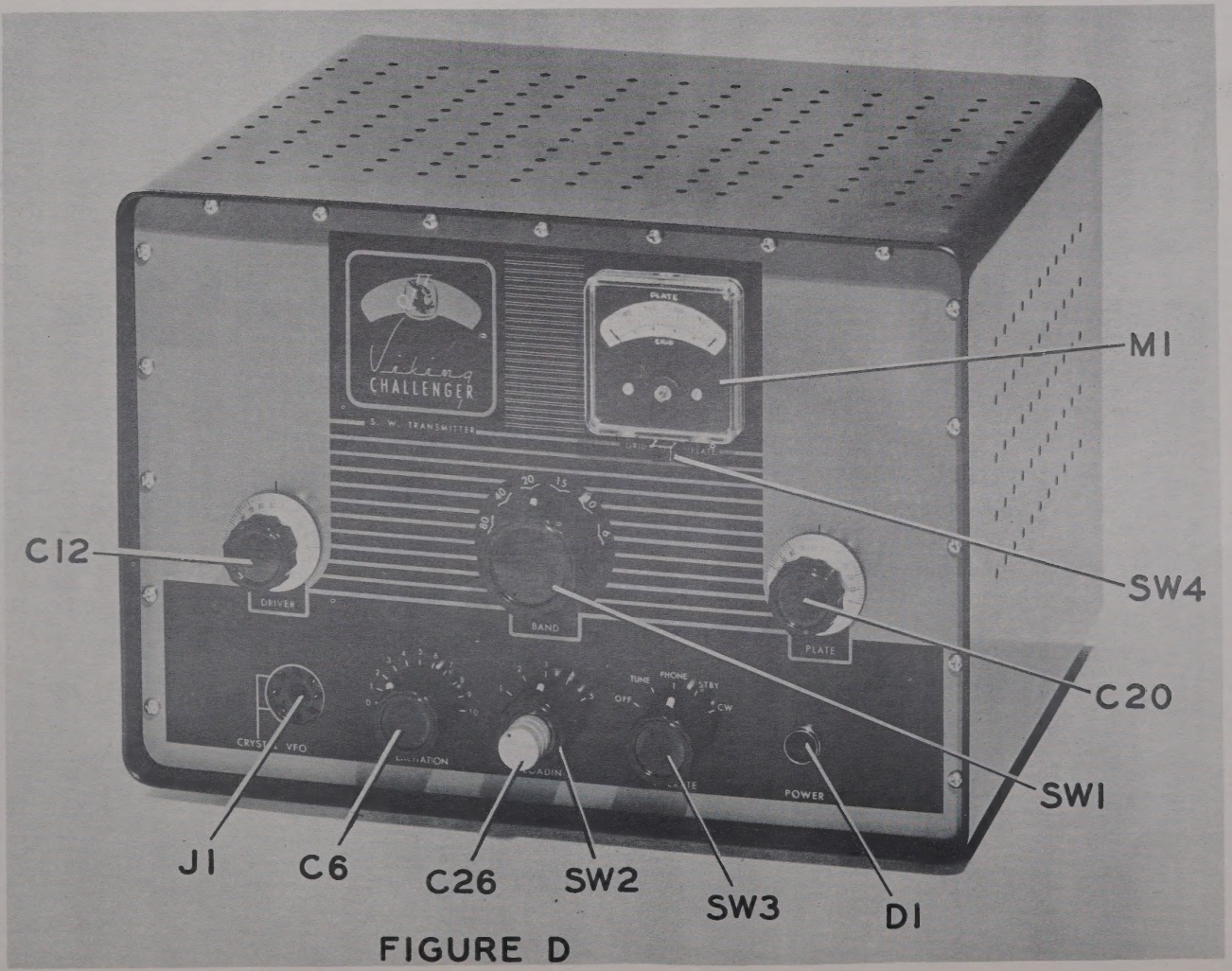
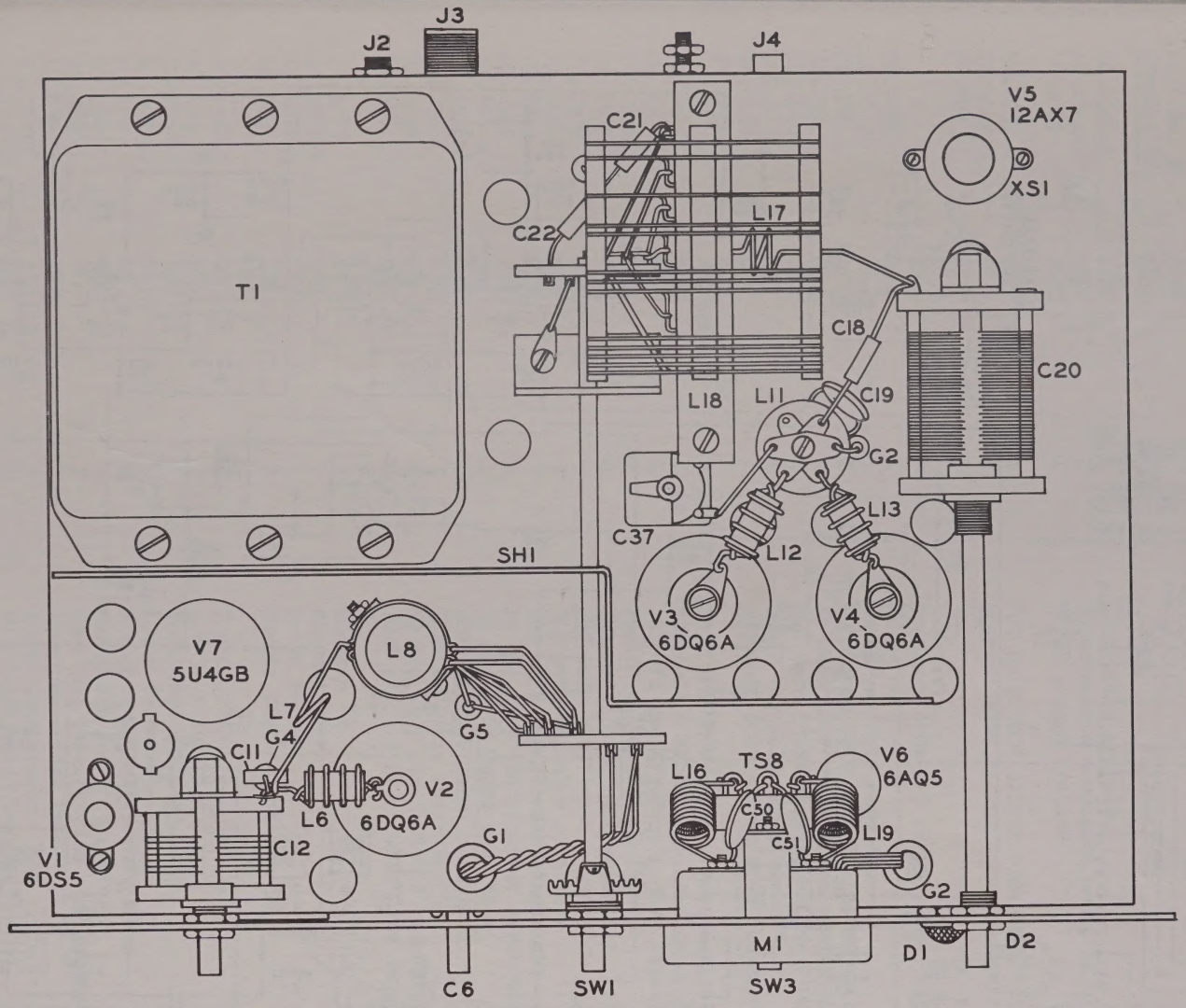
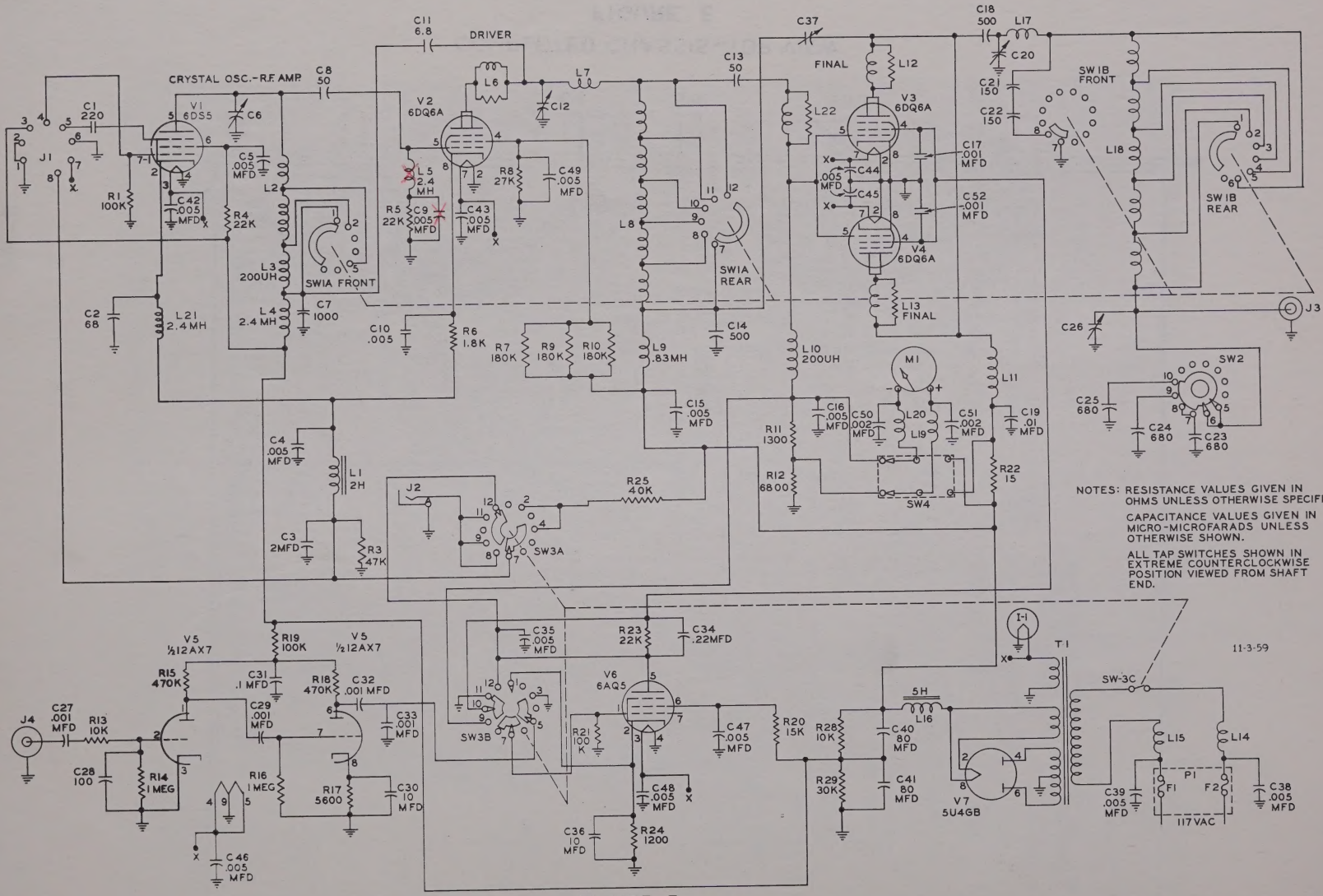

Viking
CHALLENGER
PLATE
DRIVER
BAND
PLATE
TUNE
PHONE
STBY
OFF
CW
POWER
M1
SW4
C12
C20
SW1
J1
C6
C26
SW2
SW3
D1

FIGURE D



COMPLETED CHASSIS-TOP VIEW

FIGURE E



NOTES: RESISTANCE VALUES GIVEN IN OHMS UNLESS OTHERWISE SPECIFIED

CAPACITANCE VALUES GIVEN IN MICRO-MICROFARADS UNLESS OTHERWISE SHOWN.

ALL TAP SWITCHES SHOWN IN EXTREME COUNTERCLOCKWISE POSITION VIEWED FROM SHAFT END.

FIGURE F

VIKING CHALLENGER TRANSMITTER

Parts List

Part No. or Drawing No.	Item No.	Qty.	Description
16.1001-1	BKT1	1	Bandswitch bracket
16.1001-2	BKT2	1	Underchassis component mounting bracket
16.1395	BKT3	1	Meter switch bracket
22.4057-5	C1	1	220 mmfd. 500V silver mica capacitor
22.4045-5	C2	1	68 mmfd 500V silver mica capacitor
22.827	C5,4,9,10,15, 16,35,38,39, 42-49	17 16	.005 mfd 600V GMV ceramic disc capacitor
22.1484	C3	1	2 mfd 200V W
148-6-2	C6	1	100S8 variable capacitor
22.805	C7	1	1000 mmfd 500V silver mica capacitor
22.776	C8,13	2	50 mmfd 500V silver mica capacitor
22.1410	C11	1	6.8 mmfd 1500V mica capacitor
149-3-3	C12	1	50R12 variable capacitor
22.4167-5	C14	1	500 mmfd 500V silver mica capacitor
22.1184	C17,27,29,32 33, 52	56	.001 mfd 600V ceramic disc capacitor
22.1506	C18	1	500 mmfd 6 KV ceramic disc capacitor
22.826	C19	1	.01 mfd 1.5 KV ceramic disc capacitor
149-10-6	C20	1	250R12 variable capacitor
22.1507	C21,22	2	150 mmfd 1000V mica capacitor
22.1508	C23,24,25	3	680 mmfd 1500V mica capacitor
22.1102-2	C26	1	700 mmfd variable capacitor
22.923	C28	1	100 mmfd ceramic disc capacitor
22.1521	C30,36	2	10 mfd 25VW electrolytic capacitor
22.768	C31	1	.1 mfd 400V paper capacitor
22.1026	C34	1	.22 mfd 200V paper capacitor
148-76-4	C37	1	7S14 variable capacitor
22.1298	C40,41	2	80 mfd 450V electrolytic capacitor
22.956	C50,51	2	.002 mfd 1.5 KV ceramic disc capacitor
17.1077	CH1	1	Chassis
23.1281-4	CH2	1	Cabinet
17.1078-3	CH3	1	Front Panel
22.928-1	CH4,5,6,7	4	Bumper feet
147-310-3	D1	1	Green jewel
13.123-12	D2	1	3/8-32 Panel bearing
104-264-3	D3	1	Insulated shaft coupler
23.907-22	D4,5	2	100-0 Knobs
23.1245	D6,7	2	Phenolic knob 1 1/8" diameter
23.1246	D8	1	Band knob 1 5/8" diameter
23.1248	D9	1	Phenolic outer knob 1 1/8" diameter
13.889-1	D10	1	Aluminum center knob
14.31-67	D11,12	2	Final tank spacer
13.123-15	D13	1	9/32"-3/8 Panel bearing
22.1505	E1	1	Plate cap 1/4" dia.
13.904-4	E2,3	2	Plate caps
22.742	F1,2	2	5 amp. Fuse

VIKING CHALLENGER TRANSMITTER

Parts List

Part No. or Drawing No.	Item No.	Qty.	Description
22.113-1	G1,2,3	3	9/16" O.D. Grommet
22.113-5	G4,5,6	3	11/32" O.D. Grommet
			#4 & #8 Hardware envelope
			#6 Hardware envelope
			#10 Hardware envelope
			Setscrew Hardware envelope
			Sheet Metal Screws Hardware envelope
			Solder Lugs Hardware envelope
22.377	I1	1	#51 Pilot lamp
22.1503	J1	1	Black molded octal socket
22.1246	J2	1	Single closed circuit jack
22.746	J3	1	83-1R coaxial receptacle
22.1096	J4	1	Microphone jack
23.1212-2	L22	1	Parasitic suppressor (grid)
22.1333	L1	1	2 Henry 50 ma. choke
23.1328	L2	1	Oscillator coil
22.844-1	L3,10	2	200 uh R.F. choke
22.1193	L4,5,21	3	2.4 mh R.F. choke
23.1329	L6	1	Parasitic suppressor (driver)
16.1398-1	L7	1	6 Meter buffer coil
23.1327	L8	1	Buffer coil
102-750	L9	1	.83 mh R.F. choke
102-752-5	L11	1	1 mh R.F. choke
23.1329	L12,13	2	Parasitic suppressor (final)
22.1502	L16	1	5 Henry 250 ma. filter choke
16.1398-2	L17	1	6 Meter final coil
23.1061-2	L18	1	Final coil
22.1500	M1	1	Meter
22.981	P1	1	Fused power plug
22.5097-10	R1,19,21	3	100K ohm 1/2 watt carbon resistor 10%
22.7089-10	R3	1	47K ohm 2 watt carbon resistor 10%
22.5081-10	R4,5	2	22K ohm 1/2 watt carbon resistor 10%
22.9086-10	R6	1	1800 ohm 7 watt resistor 10%
22.7083-10	R8	1	27K ohm 2 watt carbon resistor 10%
22.7103-10	R7,9,10	3	180K ohm 2 watt carbon resistor 10%
22.5051-5	R11	1	1200 ohm 1/2 watt carbon resistor 5%
22.6069-10	R12	1	6800 ohm 1 watt carbon resistor 10%
22.5073-10	R13	1	10K ohm 1/2 watt carbon resistor 10%
22.5121-10	R14,16	2	1 megohm 1/2 watt carbon resistor 10%
22.5113-10	R15,18	2	470K ohm 1/2 watt carbon resistor 10%
22.5067-10	R17	1	5600 ohm 1/2 watt carbon resistor 10%
22.9108-10	R20	1	15K ohm 7 watt resistor 10%

VIKING CHALLENGER TRANSMITTER

Parts List

Part No. or Drawing No.	Item No.	Qty.	Description
22.6005-5	R22	1	15 ohm 1 watt carbon resistor 5%
22.6081-10	R23	1	22K ohm 1 watt carbon resistor 10%
22.5051-10	R24	1	~~2200~~ 1200 ohm 1/2 watt carbon resistor 10%
22.8904-10	R28	1	10K ohm PW10 10 watt resistor 10%
22.972	R29	1	30K ohm 20 watt resistor 10%
22.1651	R25	1	40K ohm 15 watt wire wound resistor ± 5%
17.1076	SH1	1	Final shield
22.1498	SW1	1	Bandswitch
22.1406	SW2	1	Output coupling switch
22.1499	SW3	1	Operate switch
22.921	SW4	1	Meter switch
22.1501	T1	1	Power transformer
22.740-3	TS1,2	2	3 lug terminal strip
22.740-2	TS3	1	2 lug terminal strip (2 mounting feet)
22.740-4	TS4-7	4	4 lug terminal strip
22.1401-1	TS8	1	3 lug terminal strip (1 mounting foot)
22.1650	V1	1	6DS5 electron tube
22.1504	V2,3,4	3	6DQ6A electron tube
22.915	V5	1	12AX7 electron tube
22.781	V6	1	6AQ5 electron tube
22.1104	V7	1	5U4GB electron tube
71.27-122	W1	3 ft.	#20 bare tinned copper wire
71.91-100	W2	7 ft.	#20 black plastic covered tinned copper wire
71.91-101	W3	8 ft.	#20 brown plastic covered tinned copper wire
71.91-102	W4	12 3/4 ft.	#20 red plastic covered tinned copper wire
71.91-105	W5	5 ft.	#20 green plastic covered tinned copper wire
71.27-115	W6	2 1/2 ft.	#16 bare tinned copper wire
71.27-120	W7	1 ft.	#18 bare tinned copper wire
71.13-125	W8	10 ft.	#18 formex or nylclad copper wire
71.49-114	W9	7 ft.	Black line cord 18-2 POSJ type
42-24-050	W10	3/4 ft.	.053 I.D. varnished tubing
22.997	W11	1/2 ft.	3/8 round wood dowel
147-610-5	XI1	1	Lamp socket bayonet
22.1208	XV1	1	7 pin miniature mica filled socket, shielded
22.975	XV6	1	7 pin miniature mica filled socket
22.1207	XV5	1	9 pin miniature mica filled shielded socket
22.1274	XV2-4,7	4	Octal mica filled socket
22.1218-1	XS1	1	9 pin tube shield
22.1218-2	XS2	1	7 pin tube shield

E. F. JOHNSON COMPANY, VIKING EQUIPMENT QUESTIONNAIRE

Your cooperation in returning this questionnaire along with your warranty cards to the E. F. JOHNSON COMPANY at your earliest convenience will help us in designing our future amateur equipment.

NAME _____ CALL _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

1. EQUIPMENT _____ SERIAL NO. _____ DATE OF DELIVERY _____
2. DISTRIBUTOR FROM WHOM PURCHASED? _____
3. WAS THE EQUIPMENT DELIVERED FROM YOUR DISTRIBUTOR'S STOCK? _____
4. IF NOT, HOW LONG DID YOU WAIT FOR DELIVERY? _____
5. WAS THE EQUIPMENT A KIT? _____ OR FACTORY WIRED AND TESTED? _____
6. WAS THE WORKMANSHIP SATISFACTORY? _____
7. WERE THERE ANY OBVIOUS DEFECTS? _____
8. WERE THERE ANY SHORTAGES? _____
9. WAS THERE ANY SHIPPING DAMAGE? _____
10. WAS ANY DIFFICULTY EXPERIENCED IN PLACING THE UNIT ON THE AIR? _____
11. ARE THE COLORS USED ON THE CABINET AND PANEL PLEASING? _____
12. IS THE PANEL LAYOUT PLEASING? _____
13. ARE THE CONTROLS CONVENIENT TO USE? _____
14. ARE YOU ENTIRELY SATISFIED WITH YOUR UNIT AND ITS PERFORMANCE ON THE AIR? _____
15. IF NOT, EXPLAIN. _____
16. WHAT FEATURES DO YOU FIND THE MOST DESIRABLE IN THIS UNIT? _____
17. WHAT FEATURES DO YOU LIKE LEAST IN THIS UNIT? _____

18. WHAT IMPROVEMENTS WOULD YOU RECOMMEND IN THIS UNIT?_____

_____

19. HOW DID YOU BECOME INTERESTED IN THIS NEW PIECE OF EQUIPMENT?_____

_____

20. HOW DO YOU LEARN ABOUT EQUIPMENT AND FEATURES BEFORE YOU BUY?_____

_____

21. WHAT TYPE OF ANTENNA(S) DO YOU USE?_____

_____

22. ARE YOU USING AN ANTENNA COUPLER?_____TYPE_____

23. ARE YOU USING A DIRECTIONAL COUPLER AND INDICATOR?___TYPE_____

24. WHAT OPERATING ACCESSORIES (SUCH AS MONITORS, CALIBRATORS, PHONE PATCHES, ETC.) DO YOU USE?_____

_____

25. WHAT MAKE AND MODEL OF RECEIVER DO YOU USE?_____

26. WHAT PERCENTAGE OF TIME IS SPENT OPERATING LOW POWER?_____HIGH POWER?_____

27. WHAT PERCENTAGE OF TIME IS SPENT OPERATING SSB?_____AM?_____CW?_____

28. WHAT PERCENTAGE OF OPERATING TIME IS SPENT ON THE FOLLOWING? DX_____

RAGCHEWING_____CONTESTS_____EXPERIMENTING_____

29. WHAT PERCENTAGE OF TIME DO YOU OPERATE ON THE FOLLOWING BANDS? 160_____

80_____40_____20_____15_____10_____6_____2_____

MARS_____OTHERS_____

30. HOW DO YOU RATE JOHNSON EQUIPMENT IN TERMS OF:

QUALITY	GOOD_____	FAIR_____	POOR_____
VALUE	GOOD_____	FAIR_____	POOR_____
PERFORMANCE	GOOD_____	FAIR_____	POOR_____
APPEARANCE	GOOD_____	FAIR_____	POOR_____

31. WHAT AMATEUR TRANSMITTER DO YOU BELIEVE TO BE THE BEST BUY ON THE MARKET, CONSIDERING ITS PRICE, POWER, QUALITY AND FEATURES?_____

_____

32. WHAT ADDITIONAL ITEMS OF AMATEUR EQUIPMENT WOULD YOU LIKE TO SEE ON THE MARKET AND WHAT WOULD YOU CONSIDER A REASONABLE PRICE FOR EACH ITEM?_____

_____

33. ADDITIONAL COMMENTS._____

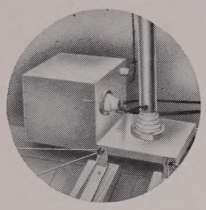
_____

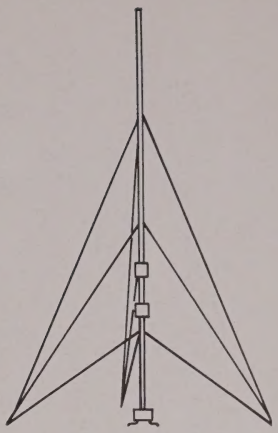
_____

THANK YOU!

for every amateur operator

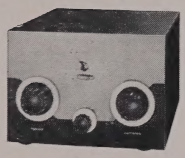
Station Accessories





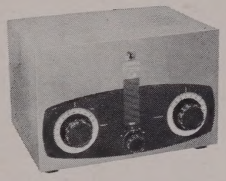
"MATCHSTICK"—Fully automatic, pre-tuned multiband vertical antenna system. Band-switching 80 through 10 meters. Remotely motor driven from operating position. Easily mounts on roof top or in limited space location. Low SWR (less than 2 to 1) all bands. Impedance: 52 ohms. Complete with 35′ mast, base, tuning network, relays, control box and high-strength, durable Dacron guy lines.

Cat. No.		Amateur Net
137-102		$129.50



275 WATT "MATCHBOX"—Performs antenna loading and switching functions required in medium power amateur stations. Bandswitching 80, 40, 20, 15, and 10-11 meters. Matches balanced antennas from 25 to 1250 ohms and unbalanced or single wire antennas from 25 to 3000 ohms. Input impedance, 52 ohms, rated 275 watts. Fully shielded. Provision for RF probe.

Cat. No.		Amateur Net
250-23	Wired	$54.95

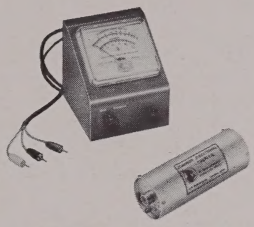


KILOWATT "MATCHBOX" — Band-switching 80, 40, 20, 15, and 10-11 meters — self-contained. Use with transmitters up to 1000 watts input—handles unbalanced line impedances from 50 to 1200 ohms and balanced line impedances from 50 to 2000 ohms. No coils to change, no "tapping down" on the inductor. Fully shielded. Provision for RF probe.

Cat. No.		Amateur Net
250-30	Wired	$124.50

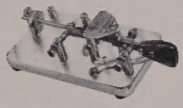
T-R SWITCH—Provides instantaneous high-efficiency electronic antenna switching. Excellent receiver isolation. Gain: 2 db at 30 mcs.; 6 db at 3.5 mcs. Rated at 4000 watts peak power. Instantaneous break-in on SSB, DSB, CW or AM. Will not affect transmission line SWR—provides an effective impedance match to most receivers through 3 to 30 mc. range. With tube, power supply, and provision for RF probe.

Cat. No.		Amateur Net
250-39	Wired	$27.75



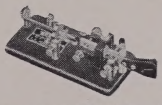
DIRECTIONAL COUPLER AND INDICATOR—Provides continuous reading of SWR and relative power in transmission line. Coupler may be permanently installed in 52 ohm coaxial line—handles maximum legal power specified by FCC. Commercial multimeter may be used as indicating instrument—curves supplied for popular multimeter basic ranges. Indicator is a 0-100 microammeter calibrated in SWR and relative power. Monitors incident or reflected power quickly with flip of a switch.

Cat. No.		Amateur Net
250-37	Coupler	$11.75
250-38	Indicator	25.00



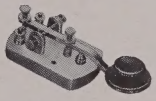
DELUXE SEMI-AUTOMATIC KEYS—Adjustable from lowest to highest speeds. All machine parts heavily chrome plated. Five adjustments with lock nuts—molded plastic paddles.

Cat. No.		Amateur Net
114-500	1/8" contacts, black wrinkle base	$17.95
114-501	1/4" contacts, polished chrome base	20.65



SPECIAL SEMI-AUTOMATIC KEY — Many operating features—attractively finished, black wrinkle enamel base. All hardware and vibrator heavily chrome plated. Easy action, adjustable from lowest to highest speeds.

Cat. No.		Amateur Net
114-520	Semi-Automatic	$13.95

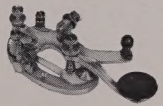


HEAVY DUTY KEYS—Heavy die cast, chrome plated key arm. Large 1/4" coin silver contacts. Improved Navy-type knob. Adjustable steel bearings and spring design.

Cat. No.		Amateur Net
114-320	Black wrinkle enamel base	$4.70
114-321	Polished chrome plated base	5.85

STANDARD KEYS — Heavy die cast base. Smooth adjustable bearings. Provision for plugging in semi-automatic keys. 1/8" coin silver contacts.

Cat. No.		Amateur Net
114-310	Black wrinkle, no switch	$3.10
114-310-3	Black wrinkle with switch	3.90
114-311	Chrome plated, no switch	5.20
114-311-3	Chrome plated with switch	6.10



HIGH SPEED STANDARD KEYS—Fully adjustable spring tension, contact spacing and bearings. Brass base and binding posts—instrument lacquer finish. .072" platinor contacts.

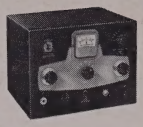
Cat. No.		Amateur Net
114-100	R48 Key, satin brass no switch	$5.95
114-100-3	M100 Key, satin brass with switch	6.85

PHENOLIC BASE KEYS—High quality key with adjustable bearings. Improved spring-pigtail connection. 1/8" coin silver contacts—nickel plated metal parts.

Cat. No.		Amateur Net
114-301	Molded phenolic base	$2.50

CORD AND WEDGE—Cord and wedge for easy attachment of semi-automatic key across circuit-closing switch of a standard hand key. Ideal for amateur service where both hand key and semi-automatic are used.

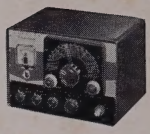
Cat. No. 114-380 Cord and Wedge ..... Amateur Net $1.15



VIKING "ADVENTURER"

50 watts CW, bandswitching 80 through 10 meters, effectively TVI suppressed. Crystal or external VFO control.

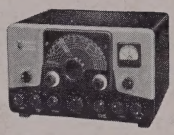
Cat. No. 240-181-1....Kit
Amateur Net.....$54.95



VIKING "NAVIGATOR" TRANSMITTER/EXCITER

Enough RF power to excite most high powered final amplifiers on CW and AM. 40 watts input. Bandswitching 160 through 10 meters.

Cat. No. 240-126-1.....Kit
Amateur Net.....$149.50
Cat. No. 240-126-2.....Wired
Amateur Net.....$199.50



VIKING "RANGER"

Also serves as RF/audio exciter for high power equipment. 75 watts CW or 65 watts phone input. Bandswitching 160 through 10 meters.

Cat. No. 240-161-1.....Kit
Amateur Net.....$229.50
Cat. No. 240-161-2.....Wired
Amateur Net.....$329.50

VIKING "VALIANT"

275 watts input CW and SSB (P.E.P. with auxiliary SSB exciter), 200 watts high level AM. Bandswitching 160 through 10.

Cat. No. 240-104-1.....Kit
Amateur Net.....$349.50
Cat. No. 240-104-2.....Wired
Amateur Net.....$439.50

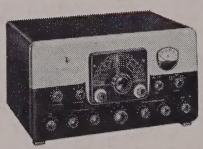
VIKING "FIVE HUNDRED"

600 watts CW, 500 watts AM and SSB. (P.E.P. with auxiliary SSB exciter.) Bandswitching 80 through 10. Push-to-talk. With tubes.

Cat. No. 240-500-1.....Kit
Amateur Net.....$749.50
Cat. No. 240-500-2.....Wired
Amateur Net.....$949.50

Johnson

amateur equipment



VIKING "PACEMAKER" TRANSMITTER/EXCITER

An outstanding transmitter . . . the perfect exciter! 90 watts SSB P.E.P. and CW input . . . 35 watts AM. Instant bandswitching 80, 40, 20, 15, and 10 meters.

Cat. No. 240-301-2.....Wired
Amateur Net.....$495.00

VIKING "COURIER" AMPLIFIER

500 watts PEP input with auxiliary SSB exciter; 500 watts CW or 200 AM. Continuous coverage 3.5 to 30 mcs.

Cat. No. 240-352-1.....Kit
Amateur Net.....$244.50
Cat. No. 240-352-2.....Wired
Amateur Net.....$289.50

VIKING "THUNDERBOLT" AMPLIFIER

2000 watts P.E.P. input SSB with auxiliary SSB exciter; 1000 watts CW; 800 watts AM linear. Continuous coverage 3.5 to 30 mcs.

Cat. No. 240-353-1.....Kit
Amateur Net.....$524.50
Cat. No. 240-353-2.....Wired
Amateur Net.....$589.50

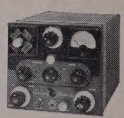
VIKING "6N2" Bandswitching 6 and 2 meters—150 watts CW and 100 watts AM. Use with Viking "Ranger," or similar power supply/modulator combinations.

Cat. No. 240-201-1.....Kit.....Amateur Net $129.50
Cat. No. 240-201-2....Wired.....Amateur Net $169.50

VIKING "MOBILE"

This power-packed mobile is rated at 60 watts maximum PA input. Instant bandswitching 75 through 10 meters.

Cat. No. 240-141-1.....Kit
Amateur Net.....$107.00
Cat. No. 240-141-2....Wired
available on special order.



VIKING "KILOWATT" AMPLIFIER

In a class by itself, the Viking "Kilowatt" provides 2000 watts P.E.P. SSB., 1000 watts input AM, 1000 watts CW. Compact pedestal contains complete unit—rolls out for easy accessability. Excitation requirements: 30 watts RF, 10 watts audio for AM 2-3 watts peak SSB. With tubes.

Cat. No. 240-1000 Wired Amateur Net.....$1595.00

Matching desk top, back, three-drawer pedestal.
Cat. No. 250-101-1 . . . FOB Corry, Pa.....$132.00

E. F. Johnson Company

WASECA, MINNESOTA

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